Remarks/Arguments

Applicant has carefully considered the rejection in the previous office action and submits the following response. In the present response, claims 1-17 are amended and new claims 18-21 are added. The amendments add no new matter, and are believed to place the application in condition for allowance.

-"Lambda"

The Examiner "assumed for the sake of examination" that "lambda," as recited in the claims, is "the ratio of an oxidant to fuel necessary for combustion." Final action, p. 7. Applicant respectfully disagrees with this interpretation of lambda. The specification explains that the "proportion of air in excess of that required for stoichiometric combustion is known as the excess air ratio or 'lambda', which is defined as **the ratio of total air available for combustion to that required to burn all of the fuel.**" Specification, page 3, lines 13-17 (emphasis added).

Rejections under 35 U.S.C. § 103

The examiner rejected claims 1-17 as obvious over Suppes et al (Compression-Ignition Fuel Properties of Fischer-Tropsch Syncrude, Ind. Eng. Chem. Res. 1998, 37 2029-2038) ("Suppes") in view of US 004764266 (Chen et al), US 005807413 (Wittenbrink et al), US 006787022 (Berlowitz et al) and US 003808802 (Tanasawa).

The examiner argues that, Suppes in view of Chen, Wittenbrink, and Berlowitz would have rendered it "obvious to a person having ordinary skill in the art to operate home heating systems including burners fueled with Fischer-Tropsch fuel having no additives and 'nil' or less than 1 ppm nitrogen and sulfur and low aromatic content and a density similar to that of home heating fuels" Final action, page 6. The examiner also contends that Tanasawa would have rendered it obvious to "operate combustion systems used for various purposes such as for home use, for industrial use, for gas turbines, and for jet engines with all kinds of fuels such as a Fischer-Tropsch fuel and which generally meets product specifications for use as a light fuel oil, e.g., home heating oil, diesel and jet fuels, wherein the burner is

capable of operating in a wide range of air-fuel ratio, or 'lambda.'" Office action, p. 6.

Regarding claims 13-15, the examiner contends that it would have been obvious to modify Suppes' fuel to include odor and color markers. The examiner takes "official Notice" that "it is well known to provide liquid fuels with odor or aroma [citing, for example US001944175] and color markers [citing, for example US005560855], and yellow flame coloring additives, for the purpose of aiding in readily identifying the fuel, and for aiding in making the flame visible [citing US 2002/009/0585 or US006488726].

Response

The examiner has the burden to establish a *prima facie* case of unpatentability of the pending claims on any grounds, including obviousness. *In re Oetiker*, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more, the applicant is entitled to grant of the patent. *In re Oetiker*, 24 U.S.P.Q.2d 1443. In order to establish that the new and amended claims are *prima facie* obvious over the cited references, the Examiner must point to two things in the cited references, and not in Applicants' disclosure: (1) the suggestion of the invention, and (2) the expectation of its success. *In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). The examiner cannot meet this burden with respect to the amended claims.

Where an alleged case of *prima facie* obviousness is based on a combination of references, the examiner must determine '[w]hat the prior art teaches, whether it teaches away from the claimed invention, and **whether it motivates a combination of teachings from different references.**'" *DyStar Textilfarben GmbH v. C.H. Patrick Co.*, 80 U.S.P.Q.2d 1641, 1645 (Fed. Cir. 2006) (emphasis added). The examiner must establish that "the suggestion to combine [comes] from the prior art, as filtered through the knowledge of one skilled in the art." *Id.*

-Suppes

The examiner cites Suppes as the primary reference. Suppes is directed to the evaluation of "cetane number, viscosity, cloud-point, and pour-point properties of syncrude and blends of syncrude with blend stocks such as ethanol and diethyl

ether." Suppes, abstract at 2029 (emphasis added). According to Suppes "blends comprised primarily of syncrude are **potentially good CI [Compression-Ignition] fuels**, with pour-point temperature depression being the largest development obstacle." *Id.* Suppes states that "fuels based on >70% Fischer-Tropsch syncrude ... would fill an important niche in the EPACT [U.S. Environmental Policy Act] fuel menu, namely, an affordable **liquid fuel that can be used in *conventional diesel engines***" that "generally have high cetane numbers (>65) and near-zero aromatic contents," Suppes (column 2, second full paragraph at page 2031, emphasis added).

The examiner has not pointed to a teaching or suggestion in Suppes of "a process for operating a yellow flame burner" comprising:

> providing a yellow flame burner **adapted for domestic heating** with fuel comprising a Fischer-Tropsch-derived fuel;
>
> burning the Fischer-Tropsch derived fuel in the burner to obtain flue gases and a heat of combustion ; and,
>
> **performing one or more procedure selected from the group consisting of heating water by indirect heat exchange with the flue gases in one or more boiler and heating space directly with the flue gases.**

Claims 1, 11, and 18 (emphasis added), and all dependent claims.

-The secondary references

In citing secondary references, it is improper for the examiner to change the definition of Applicant's the "field of endeavor." Specifically:

> 1. When discussing Tanasawa and apparently Suppes, the examiner defines the "field of endeavor" as the"**liquid combustion fuel field of endeavor**" (office action, p. 5, emphasis added);
>
> 2. When discussing Chen, Wittenbrink, and Berlowitz, the examiner defines the "field of endeavor" as the "**Fischer-Tropsch derived fuel field of endeavor**" (office action, p. 4-5, emphasis added);

The claims are directed to "a process for operating a yellow flame burner."

-Chen

The examiner has not pointed to a teaching or suggestion in Chen that would motivate a person of ordinary skill in the art to modify Suppes--which relates to fuel

for "conventional diesel engines"-- in the manner required to:

> provid[] a yellow flame burner **adapted for domestic heating** with fuel comprising a Fischer-Tropsch-derived fuel;
>
> burn[] the Fischer-Tropsch derived fuel in the burner to obtain **flue gases** and a heat of combustion ; and,
>
> **perform[] one or more procedure selected from the group consisting of heating water by indirect heat exchange with the flue gases in one or more boiler and heating space directly with the flue gases.**

Claims 1, 11, and 18 (emphasis added).

The examiner argues that that Chen "teaches. . . a process for using or burning **middle distillate Fischer-Tropsch derived fuel** . . . with lesser proportions of naphtha as a '**home heating oil,**'" Office action, p. 5, citing Chen, col. 10, ll. 16-34.

About four columns before the cited section which mentions home heating oil, Chen does state that "feeds from synthetic oil production processes such as Fischer-Tropsch synthesis or other synthetic processes" may be employed in Chen's "integrated refining process." Chen, col. 6, ll. 16-26. However, Chen also explains that "[t]he feedstocks which are employed in the present process may be generally characterized as high boiling point feeds ***of petroleum origin***." *Id.* (emphasis added).

The examiner has not pointed to a teaching or suggestion in Chen or elsewhere that would motivate a person of ordinary skill in the art to select a Fischer-Tropsch derived oil over a feed of petroleum origin for any particular purpose. The examiner certainly has not pointed to a teaching or suggestion that would motivate a person of ordinary skill in the art to use a Fischer-Tropsch derived oil to produce a "home heating oil," in particular.

The examiner has not established the teachngs in Chen would motivate a person of ordinary skill in the art to modify Suppes--which relates to fuel for "**conventional diesel engines**"--in the manner required to:

> provid[] a yellow flame burner **adapted for domestic heating** with fuel comprising a Fischer-Tropsch-derived fuel;

> burn[] the Fischer-Tropsch derived fuel in the burner to obtain **flue gases** and a heat of combustion ; and,
>
> **perform[] one or more procedure selected from the group consisting of heating water by indirect heat exchange with the flue gases in one or more boiler and heating space directly with the flue gases.**

Claims 1, 11, and 18 (emphasis added). The examiner has not established that "the suggestion to combine [comes] from the prior art, as filtered through the knowledge of one skilled in the art." *DyStar Textilfarben GmbH v. C.H. Patrick Co.*, 80 U.S.P.Q.2d at 1645. *Id.* The examiner certainly has not made particular findings "as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed." *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317-1318 (Fed. Cir. 2000).

The examiner has not established a case of *prima facie* obviousness of the pending claims over Suppes in view of Chen.

-Wittenbrink

Wittenbrink is directed to "**a transportation fuel** and to a method of making that fuel." Wittenbrink, col. 1, ll. 5-6. The examiner contends that Wittenbrink teaches "that fuels produced by the Fischer-Tropsch process have essentially nil sulfur and nitrogen." Final action, p. 4. The examiner also contends that Wittenbrink "does not make aromatics" or that "virtually no aromatics are produced." Office action p. 5. The examiner also argues that "particulate matter (PM) emissions were primarily affected by the cetane number, sulfur content, oxygen content and aromatic content of the fuels," but that "neither fuel density nor distillation profile had any effect on particulate matter (PM) emissions." *Id.*

The examiner has not established that Wittenbrink's teachings related to "a **transportation fuel**" would motivate a person of ordinary skill in the art to modify Suppes in the manner necessary to:

> provid[e] a yellow flame burner **adapted for domestic heating** with fuel comprising a Fischer-Tropsch-derived fuel;
>
> burning the Fischer-Tropsch derived fuel in the burner to obtain **flue gases** and a heat of combustion ; and,

> **perform[] one or more procedure selected from the group consisting of heating water by indirect heat exchange with the flue gases in one or more boiler and heating space directly with the flue gases.**

Claims 1, 11, and 18 (emphasis added), and all dependent claims.

-Berlowitz

Berlowitz describes a process for the production of a "winter diesel fuel." Berlowitz, Abstract. As explained in the background, a winter diesel fuel is used for "combustion in a vehicular diesel engine." Berlowitz, col. 1, ll. 18-55.

The examiner has not established that Berlowitz' teachings related to "diesel engine fuel" for "combustion in a vehicular diesel engine" would motivate a person of ordinary skill in the art to modify Suppes (related to fuel for "conventional diesel engines") to:

> provid[e] a yellow flame burner **adapted for domestic heating** with fuel comprising a Fischer-Tropsch-derived fuel;
>
> burning the Fischer-Tropsch derived fuel in the burner to obtain **flue gases** and a heat of combustion ; and,
>
> **performing one or more procedure selected from the group consisting of heating water by indirect heat exchange with the flue gases in one or more boiler and heating space directly with the flue gases.**

Claims 1, 11, and 18, and all dependent claims. Nor has the examiner established that the combination of Chen, Wittenbrink, and Berlowitz would provide the necessary motivation.

-Tanasawa

Tanasawa relates to a particular type of combustor which "can be used for various purposes such as for **home use, for industrial use, for gas turbines and for jet engines.**" Tanasawa, col. 1, ll. 6-9. Tanasawa discusses various "conventional combustors" (col. 1, ll. 11), and explains that "[w]hile there have been many studies about vortex combustors, a satisfactory combustor for practical use has not yet been provided." Tanasawa, col. 1, ll. 26-28. Tanasawa states that "it is an object of the present invention to provide a novel and useful vortex combustor." Tanasawa, col. 1, ll. 34-35.

The examiner points to the following portion of Tanasawa, which refers to a yellow flame:

> 2. Since the fuel stays for a long period of time in the first and the second combustion chambers because of the swirling flow pattern, the combustion efficiency becomes as high as nearly 100 percent, whether the combustion condition in the combustion chamber is the **yellow flame** combustion or the blue flame combustion.

Tanasawa, col. 14, ll. 41-47 (emphasis added). The examiner also points to the following separate portion of Tanasawa, which refers to the use of Tanasawa's vortex combuster "for home use":

> The vortex combustor of the present invention can be applied to **various combustors using heat energy for home use or industrial use, and various combustors for heat motors using mechanical energy converted from heat energy, besides gas turbine engines for automobiles and for aircraft**, which are described herein with relation to the first and second embodiments. For example, they can be used as various combustors using heat energy, such a boilers, burners, steam motors, heating apparatus and water boilers. They can also be used as the combustors for heat motors using mechanical energy which is converted from heat energy, such as various steam turbines, gas turbines, jet engines and steam engines, which **can be employed in many fields, for example, for aircraft, ships, motor vehicles, electric generation and for industrial motive force in various works.**

Tanasawa, col. 18, ll. 19-36 (emphasis added).

Tanasawa's vortex combuster may be used in a large number of applications. The examiner has not established that Tanazawa's mention that the combustion can be "**yellow flame** combustion or . . . blue flame combustion" is a teaching or suggestion that would motivate a person of ordinary skill in the art to modify Suppes in the manner required to produce a "process for operating a yellow flame burner" comprising:

> providing a yellow flame burner **adapted for domestic heating** with fuel comprising a **Fischer-Tropsch-derived fuel;**
>
> burning the Fischer-Tropsch derived fuel in the burner to obtain **flue gases** and a heat of combustion ; and,
>
> **performing one or more procedure selected from the group consisting of heating water by indirect heat exchange with the flue gases in**

one or more boiler and heating space directly with the flue gases.

Claims 1, 11, and 18, and all dependent claims. Nor has the examiner established that the combination of Chen, Wittenbrink, Berlowitz, and Tanasawa would provide the necessary motivation.

For the foregoing reasons, the examiner has not pointed to a teaching or suggestion of the invention in the cited references. *In re Vaeck*, 20 U.S.P.Q.2d at 1438. Nor has the examiner established that "the suggestion to combine [the references comes] from the prior art, as filtered through the knowledge of one skilled in the art." *DyStar Textilfarben GmbH v. C.H. Patrick Co.*, 80 U.S.P.Q.2d at 1645. *Id.* The examiner certainly has not made particular findings "as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed." *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317-1318 (Fed. Cir. 2000).

The rejection also fails to consider the invention as a whole. "Failure to consider the claimed invention as a whole is an error of law." *Jones v. Hardy*, 220 U.S.P.Q. 1021, 1025 (Fed. Cir. 1984). The rejection "ignores the problem-recognition element, and injects an improper 'obvious to try' consideration." *Jones v. Hardy*, 220 U.S.P.Q. at 1026.

The specification explains that

> Blue flame burners are known to have a desirable low NOx emission as compared to yellow flame burners. Nevertheless yellow flame burners are still widely applied and **there is thus a need to reduce the NOx of such yellow flame burners.**

Specification, p. 2, ll. 9-13 (emphasis added). The specification explains that:

> Applicants have found that the low NOx emissions of a yellow flame burner can be reduced when a Fischer-Tropsch derived fuel is used. Applicants have even found that the NOx emission can be reduced to below the level of a blue flame burner using conventional Industrial Gas Oil as fuel. An even further advantage is that the carbon monoxide emission is reduced. A next advantage is that less odour during start and extinction of the yellow flame burner has been observed when using this fuel. This is very advantageous, especially when such a burner is used in a domestic environment, wherein frequent start and stops of the burner are common. A next advantage is that the carbon monoxide and hydrocarbon emissions at the

> cold or hot start of the yellow flame burner are less as compared to when state of the art oil is used. This is also very advantageous when the burner is used in for example a domestic heating application wherein frequently the burner has to start and stop.

Specification, p. 2, ll. 16-33. See also Examples 1-4 and Figures 2-4: "[i]t is clear that the NO_x emissions are lower for the Fischer-Tropsch derived fuels as compared to when a normal gas oil or an ultra low sulphur gas oil is used" (specification, p. 9, ll. 8-10); "[i]t can be observed that both the CO and hydrocarbon emissions are less when a Fischer-Tropsch derived fuel is used when compared to when conventional gas oil is used" (specification, p. 10, ll. 11-14).

The examiner has not pointed to a teaching or suggestion of the foregoing problem in the cited references. Nor has the examiner pointed a teaching or suggestion that the the problem could be solved by.

> providing a yellow flame burner **adapted for domestic heating** with fuel comprising a Fischer-Tropsch-derived fuel;
>
> burning the Fischer-Tropsch derived fuel in the burner to obtain flue gases and a heat of combustion ; and,
>
> **performing one or more procedure selected from the group consisting of heating water by indirect heat exchange with the flue gases in one or more boiler and heating space directly with the flue gases.**

Claims 1, 11, and 18 (emphasis added), and all dependent claims.

Applicant respectfully requests that the rejection be withdrawn.

CONCLUSION

For all of the foregoing reasons, Applicants submit that the application is in a condition for allowance. If the examiner finds the application other than in condition for allowance, the examiner is requested to call the undersigned attorney at the Houston, Texas telephone number (713) 334-5151 x 200 to discuss the steps necessary for placing the application in condition for allowance. The Commissioner is hereby authorized to charge any fees in connection with this paper, or to credit

any overpayment, to Deposit Account No. **19-1800 (File No. TS8577)**, maintained by Shell Oil Company.

Respectfully submitted,

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